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In the Claims

45. (previously added) A method for introducing a liquid additive with a fluid medium stream flowing in a conduit comprising the steps of:

a) providing a nozzle having a nozzle passage of length and size sufficient to function as a fixed orifice, said nozzle passage having an exit end in fluid communication with said stream and an entrance end in fluid communication with an especially shaped bore in said nozzle and a needle moveable in said bore and shaped to variably control fluid flow to said nozzle passage entrance end between a closed position and a full open position whereat said additive in said bore flows substantially unimpeded to said passage entrance end:

b) introducing said additive into said bore at a pressure at least higher than the pressure of said moving stream in said conduit:

c) periodically moving said needle from said closed position at variably set time periods to variably set distances within said bore sufficient to pulse discrete quantities of said additive into said stream with sufficient intensity to cause said pulses to penetrate into and subsequently mix with the medium in said stream resulting in a substantially homogenous mixture of said additive and said stream medium.

46. (previously added) The method of claim 45 further including the steps of additionally controlling at least the pressure and/or temperature of said additive and at least one of the parameters of said stream selected from the group consisting of pressure, temperature and mass flow when setting the frequency and duration of said additive pulse.

47. (previously added) The method of claim 46 wherein said additive is selected from the group consisting of hardness, dyes, gas producing chemicals, compounding

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chemicals, softeners, fillers and reinforcing chemicals and said medium in said stream is selected from the group consisting of melted metal and hydrocarbons.

48. (previously added) The method of claim 47 further including the steps of providing a plasticating screw rotatable within a barrel for plasticizing plastic pellets from a hopper; rotating said screw while heating said barrel to produce a plastic melt between barrel and screw; transferring said plastic melt from said screw to a front chamber of said barrel terminating at a nozzle outlet of said barrel; providing a die or mold adjacent said nozzle outlet; introducing said additive into said melt at a location selected from the group comprising;

a) said front chamber,

b) the mold including mold sections, and

c) channels leading to the mold downstream of said barrel nozzle.

49. (previously added) The method of claim 48 wherein said additive is a gas producing agent producing foamed plastic in said mold, and said frequency and duration of said pulses controlled to produce foamed plastic of a set cell size in said mold,

50. (previously added) The method of claim 49 further including the step of intermittently pulsing said gas producing agent after a series of pulses, each pulse in said series occurring at set times and frequencies to produce within the molded product regions of foamed plastic.

51. (previously added) The method of claim 50 wherein said pulse in each series of pulses is variably altered as to frequency and/or pulse width.

52. (previously added) The method of claim 47 further including the steps of controlling the pressure of said additive in said bore and the pressure of said medium in said

conduit and maintaining the pressure differential between said additive and said medium constant to assure uniform injection of said additive into said medium.

53. (previously added) The method of claim 52 further including the step of providing a plurality of nozzle passages circumferentially spaced at set increment about said bore and at set inclinations, each nozzle passage having an entrance end uniformly closed and opened by axial movement of said needle in said bore, and positioning said nozzle in said conduit at a position relative to said passages to produce a plurality of pulsed additive streams uniformly interspersed throughout the cross-section of said medium as it travels in said conduit past said nozzle whereby homogenous mixing of said additive and said medium occurs.

54. (previously added) The method of claim 52 further including a plurality of nozzles circumferentially spaced about said conduit producing a plurality of pulsed additive streams uniformly interspersed throughout the cross-section of said medium as it travels in said conduit past said nozzles whereby homogenous mixing of said additive and said medium occurs.

55. (previously added) The method of claim 52 further including the step of changing the direction of the flow of said medium in said conduit downstream of said nozzle to cause mixing of said additives and said medium.

56. (previously added) The method of claim 55 further including the steps of providing a longitudinally extending core to define a conduit channel through which at least a portion of said medium flows, said core tapering from a position adjacent said nozzle so that the cross-sectional area of said conduit channel increases for a discrete conduit channel length; injecting said additives into said medium by said nozzle in said conduit

channel and maintaining said medium and said additives at sufficient pressure to cause said additives and medium to mix as said additives and medium expand in the expanding area of said conduit channel downstream of said nozzle.

57. (previously added) The method of claim 55 further including the step of providing a static mixer in said conduit downstream of said nozzle and mixing said medium and said additives as the fluids travel through said static mixer.

58. (previously added) The method of claim 55 further including the steps of providing flow obstructions in said conduit downstream of said nozzle and mixing said additives and said medium as said additives and medium contact and pass by said obstructions.

59. (previously added) The method of claim 55 wherein the tip of said needle is cone shaped to variably control flow of said additive in said needle bore and said needle cone has sharp edges adjacent said nozzle passage inlet end and the opening and closing of said needle passage is set at limits sufficient to cause atomized spray of said additive into to said medium stream whereat mixing and homogenization immediately occurs.

60. (previously added) The method of claim 55 wherein said nozzle is formed with a packet at the end of said bore, said nozzle passage having its entrance end opening to said pocket, said needle having a valving surface co-operating with said bore upstream of said pocket for causing valved flow of said additive to said pocket, and axially moving said needle relative to said bore set distances for closing and opening fluid communication with said pocket whereby discrete quantities of said additive are pulsed as additive drops of set size into said medium by said nozzle passage.

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61. (previously added) The method of claim 55 further including the steps of providing within said needle a needle bore, said needle having orifice passages adjacent the tip of said needle in fluid communication with said bore in said nozzle; and a needle valve in said needle bore movable within said needle bore to open and close said orifice passages, movement of said needle in said bore and movement of said needle valve being independent of one another; flowing said medium into said bore between said nozzle and said needle at a first pressure; flowing said additive into said interior bore at a second controlled pressure; and regulating the movement of said needle and said needle valve to control dosage of said additive through said orifice passages into said medium prior to said medium and additive leaving said nozzle passage.

62. (previously added) The method of claim 61 wherein said needle valve is an interior needle within said needle bore and axially movable to open and close said orifice passages.

63. (previously added) The method of claim 62 wherein said nozzle passage has a curved shape and the pressure of said medium and additive passing through said nozzle passage is controlled such that laminar flow occurs in said fixed orifice passage.

64. (previously added) The method of claim 62 wherein the flow of the medium in said needle bore creates a suction assisting in drawing said additives out from said interior bore.

65. (previously added) The method of claim 61 further including the steps of providing a plasticating screw for plasticizing plastic pellets into a melt and causing said melt to flow at a set pressure in a barrel housing said screw and having an outlet in fluid communication with at least one runner channel in fluid communication with at

least one melt channel in a die or mold and at least one of said runner or said melt channel including said needle bore as a portion thereof whereby said melt as said medium travels from said screw through said runner channel into said melt channel in said mold and at least a portion of said melt travels through said bore where it is mixed with said additive from said needle orifice and positioned by said melt channel in said die or mold.

66. (previously added) A method for blending a viscous additive with a viscous medium having different physical and/or chemical characteristics than said additives comprising the steps of

a) flowing said medium at a set velocity and medium pressure in a conduit:

b) injecting discrete quantities of said additive as pulses of a set frequency and duration at a set additive pressure higher than said medium pressure; and

c) mixing said additive and said medium into a substantially consistent mixture downstream of the position whereat said additive was injected into said stream.

67. (previously added) The method of claim 66 further including the steps of dividing said conduit into first and second channels extending a finite distance within said conduit through which said medium flows; injecting said additive pulses at an entrance end of said first channel; mixing said additives with said medium flowing in said first channel, and joining the medium flowing in the second channel with the additive /medium mixture in the first channel in said conduit downstream of said first and second

channels to form a composite mixture of medium and additive/medium in spaced relationship to one another.

68. (previously added) The method of claim 67 wherein said first channel expands in cross-section from its entrance end to its exit end and said cross-sectional area expansion causes mixing of said additives with said medium in said first channel.

69. (previously added) The method of claim 67 further including the step of providing an extruder screw for plasticizing a plastic to form said medium as a plastic melt; controlling rotation and heating of said extruder screw to control pressure and flow of said melt in said conduit; said conduit extending through and including a die mold, said first and second channels formed within said die mold.

70. (previously added) The method of claim 67 wherein said additive is a gas forming substance, said die mold is open to atmosphere downstream of said first and second channels,said additive foaming downstream of said channel to form a plastic product containing a foamed plastic section.

71. (previously added) The method of claim 67 wherein said first channel expands in cross-section from its entrance end to its exit end, said additive is a gas forming substance, said die mold is open to atmosphere, said additive producing gas in said expanding channel to form a foamed plastic, said foamed plastic joined with said plastic melt to form a plastic product having foamed sections therein.

72. (previously added) The method of claim 71 wherein the cell size of the foamed plastic is controlled by the pulsing of the gas producing additive to produce macro or microcellular foamed with gas forming substances such as physical blowing agents.

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73. (previously added) The method of claim of claim 67 wherein said medium is a first plastic composition and said additive is a second plastic composition, said method further including the step of providing a static mixer in said conduit and passing said first and second plastic compositions through said static mixer to form a plastic compound having properties associated with said first and second plastic compositions.

74. (previously added) The method of claim 66 further including the step of providing a nozzle having a discharge passage in fluid communication with said conduit, a bore axially extending therein containing a push-rod and said additive, and a one-way valve at said discharge passage preventing said medium from entering said bore, and said injecting step comprises vibrating said push-rod in an axial direction to cause said additives to pass said one-way valve and enter said conduit.

75. (previously added) The method of claim 74 further including the step of providing an axially extending passage within said push-rod communicating with said bore and a spring biased one-way valve between said passage and said bore and said vibrating step opening said spring biased one way valve to permit additives to pulse flow into said bore and into said conduit.

76. (currently amended) A system for introducing ~~a viscous~~ an additive into a viscous medium comprising:

a conduit having an inlet and an outlet;

means for introducing ~~said~~ a viscous medium into said conduit inlet;

an injector having a nozzle with an axially extending bore therein, said nozzle having a nozzle passage with a nozzle outlet in fluid communication with said conduit and an inlet in fluid communication with said bore, a needle extending axially within

said bore and having valve means associated therewith for controlling fluid communication of said bore with said inlet of said nozzle passage as a function of the axial position of said needle in said bore;

a pressure regulator for controlling the pressure of ~~said~~ an additive in said bore and ~~said~~ the viscous medium in said conduit;

actuating means for axially moving said needle in said bore in response to an electrical signal in a cyclical manner from a first position whereat said nozzle passage inlet is closed to a second position whereat said nozzle passage inlet is in fluid communication with said bore to a set degree, said movement from said first position to said second position occurring at a set frequency and at a set time for said second position whereby said additive is pulsed into said medium.

77. (previously added) The system of claim 76 further including mixing means in said conduit downstream of said nozzle for causing the direction of said medium with said additive to change promoting mixing of said medium with said additive.

78. (previously added) The system of claim 77 wherein said mixing means includes a static mixer in said conduit.

79. (previously added) The system of claim 77 wherein said mixing means includes a plurality of longitudinally spaced obstructions within said conduit downstream of said nozzle.

80. (previously added) The system of claim 77 wherein said mixing means includes a longitudinally extending channel within said conduit having a channel inlet and a channel outlet, said channel having a longitudinally- extending portion thereof of increasing cross-sectional area in the direction of said channel outlet and said nozzle adjacent said channel inlet.

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81. (currently amended) The system of claim 77 wherein the diameter of said nozzle passages is between 0.08 and 0.2 mm and said pressure regulator is set to establish a higher additive pressure in said bore than said melt in said conduit whereby said nozzle passages act as orifices.

82. (previously added) The system of claim 81 wherein said nozzle bore has a nozzle seat formed therein upstream of said nozzle passage inlet and said needle has a valving surface adjacent said nozzle seat for opening and closing said nozzle seat as a function of axial position of said needle in said bore.

83. (previously added) The system of claim 82 wherein said valve seat has sharp edge surfaces whereby atomized spray exits from said nozzle passage outlet into said medium.

84. (previously added) The system of claim 82 wherein said nozzle has a plurality of nozzle passages circumferentially spaced about said nozzle at set inclined angles relative to the longitudinal direction of said nozzle.

85. (currently amended) The system of claim 83 wherein said nozzle has a pocket at ~~its~~ an end thereof and through which said nozzle passage extends, said valve seat being disposed upstream of said pocket whereby discrete drops of additives ~~made~~ may be injected into said medium upon opening and closing of said nozzle with said valve seat.

86. (previously added) The system of claim 81 further including said needle having a needle bore axially extending therein; said needle having orifice passages adjacent the tip of said needle in fluid communication with said bore in said nozzle and a needle

valve is said needle bore movable within said bore to open and close said orifice passages; and said actuator means controlling said needle valve and the position of said needle independently of one another.

87. (previously added) The system of claim 86 wherein said needle valve is an interior needle within said needle bore and said actuator means effective to move said interior needle within said needle bore to open and close said orifice passages and said regulator effective to supply pressurized additive to said needle bore and pressurized medium to said bore between said nozzle and said needle.

88. (previously added) The system of claim 77 further including an extruder plasticating screw within an extruder barrel for forming said medium as a plastic melt, said regulator controlling the rotation of said extruder screw and the temperature of said barrel to control the pressure of said melt, said extruder barrel having a space forward of said screw for receiving said melt terminating at an extruder nozzle, a die mold adjacent said extruder nozzle and melt channels between said nozzle and said mold or within said mold, said additive selected as at least one element from the group comprising gas producing substances, dyes, hardeners, softeners, fillers, blends and reactants and said conduit comprising at least one element selected from the group comprising said forward space, said melt channels and said die mold.

89. (previously added) The system of claim 77 further including a reciprocal in-line injection molding plasticating screw within an injection barrel for forming said medium as a plastic melt, said regulator controlling the rotation and translation of said screw and the temperature of said barrel to control the pressure of said melt, said barrel having a space forward of said screw for receiving said melt terminating at an